Apprenticeship and Industry Training

Sprinkler Systems Installer

Apprenticeship Course Outline

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Alberta

Apprenticeship and Industry Training

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Sprinkler Systems Installer
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Apprenticeship

Apprenticeship is post-secondary education with a difference. Apprenticeship begins with finding an employer. Employers hire apprentices, pay their wages and provide on-the-job training and work experience. Approximately 80 per cent of an apprentice's time is spent on the job under the supervision of a certified journeyperson or qualified tradesperson. The other 20 per cent involves technical training provided at, or through, a post-secondary institution – usually a college or technical institute.

To become certified journeypersons, apprentices must learn theory and skills, and they must pass examinations. Requirements for certification—including the content and delivery of technical training—are developed and updated by the Alberta Apprenticeship and Industry Training Board on the recommendation of Sprinkler Systems Installer Provincial Apprenticeship Committee.

The graduate of the Sprinkler Systems Installer apprenticeship program is a certified journeyperson who will be able to:

- through competent application of skill and knowledge, be proficient in all phases of sprinkler systems installation and maintenance
- know the characteristics and installation requirements of fire protection equipment
- read and interpret plans and specifications
- calculate material quantities
- be proficient in the safe use and maintenance of hand tools, machines and equipment required to become a competent journeyperson
- be thoroughly familiar with the safety requirements of sprinkler installations
- relate to job situations regarding other trades that precede or follow
- recognize that supervisory and management opportunities in the sprinkler industry are often available to trained and certified journeypersons who demonstrate above average capabilities and motivation
- perform assigned tasks in accordance with quality and production standards required by industry

Apprenticeship and Industry Training System

Industry-Driven

Alberta's apprenticeship and industry training system is an industry-driven system that ensures a highly skilled, internationally competitive workforce in more than 50 designated trades and occupations. This workforce supports the economic progress of Alberta and its competitive role in the global market. Industry (employers and employees) establishes training and certification standards and provides direction to the system through an industry committee network and the Alberta Apprenticeship and Industry Training Board. The Alberta government provides the legislative framework and administrative support for the apprenticeship and industry training system.

Alberta Apprenticeship and Industry Training Board

The Alberta Apprenticeship and Industry Training Board provides a leadership role in developing Alberta's highly skilled and trained workforce. The board's primary responsibility is to establish the standards and requirements for training and certification in programs under the Apprenticeship and Industry Training Act. The board also provides advice to the Minister of Advanced Education on the needs of Alberta's labour market for skilled and trained workers, and the designation of trades and occupations.

The thirteen-member board consists of a chair, eight members representing trades and four members representing other industries. There are equal numbers of employer and employee representatives.

Industry Committee Network

Alberta's apprenticeship and industry training system relies on a network of industry committees, including local and provincial apprenticeship committees in the designated trades, and occupational committees in the designated occupations. The network also includes other committees such as provisional committees that are established before the designation of a new trade or occupation comes into effect. All trade committees are composed of equal numbers of employer and employee representatives. The industry committee network is the foundation of Alberta's apprenticeship and industry training system.

Local Apprenticeship Committees (LAC)

Wherever there is activity in a trade, the board can set up a local apprenticeship committee. The board appoints equal numbers of employee and employer representatives for terms of up to three years. The committee appoints a member as presiding officer. Local apprenticeship committees:

- monitor apprenticeship programs and the progress of apprentices in their trade, at the local level
- make recommendations to their trade's provincial apprenticeship committee (PAC) about apprenticeship and certification in their trade
- promote apprenticeship programs and training and the pursuit of careers in their trade
- make recommendations to the board about the appointment of members to their trade's PAC
- help settle certain kinds of disagreements between apprentices and their employers
- carry out functions assigned by their trade's PAC or the board

Provincial Apprenticeship Committees (PAC)

The board establishes a provincial apprenticeship committee for each trade. It appoints an equal number of employer and employee representatives, and, on the PAC's recommendation, a presiding officer - each for a maximum of two terms of up to three years. Most PACs have nine members but can have as many as twenty-one. Provincial apprenticeship committees:

- Make recommendations to the board about:
    - standards and requirements for training and certification in their trade
    - courses and examinations in their trade
    - apprenticeship and certification
    - designation of trades and occupations
    - regulations and orders under the Apprenticeship and Industry Training Act
- monitor the activities of local apprenticeship committees in their trade
- determine whether training of various kinds is equivalent to training provided in an apprenticeship program in their trade
- promote apprenticeship programs and training and the pursuit of careers in their trade
- consult with other committees under the Apprenticeship and Industry Training Act about apprenticeship programs, training and certification and facilitate cooperation between different trades and occupations
- consult with organizations, associations and people who have an interest in their trade and with employers and employees in their trade
- may participate in resolving certain disagreements between employers and employees
- carry out functions assigned by the board

Sprinkler Systems Installer PAC Members at the Time of Publication

Ms. S. Vollmer	Edmonton	Presiding Officer
Mr. J. Anderson	Calgary	Employer
Mr. B. Popoff	Edmonton	Employer
Mr. J. Stewart	Edmonton	Employer
Mr. R. Billard	Calgary	Employee
Mr. D. Dueck	Stony Plain	Employee
Mr. S. Jeges	Edmonton	Employee

Alberta Government

Alberta Advanced Education works with industry, employer and employee organizations and technical training providers to:

- facilitate industry's development and maintenance of training and certification standards
- provide registration and counselling services to apprentices and employers
- coordinate technical training in collaboration with training providers
- certify apprentices and others who meet industry standards

Technical Institutes and Colleges

The technical institutes and colleges are key participants in Alberta's apprenticeship and industry training system. They work with the board, industry committees and Alberta Advanced Education to enhance access and responsiveness to industry needs through the delivery of the technical training component of apprenticeship programs. They develop lesson plans from the course outlines established by industry and provide technical training to apprentices.

Apprenticeship Safety

Safe working procedures and conditions, incident/injury prevention, and the preservation of health are of primary importance in apprenticeship programs in Alberta. These responsibilities are shared and require the joint efforts of government, employers, employees, apprentices and the public. Therefore, it is imperative that all parties are aware of circumstances that may lead to injury or harm.

Safe learning experiences and healthy environments can be created by controlling the variables and behaviours that may contribute to or cause an incident or injury. By practicing a safe and healthy attitude, everyone can enjoy the benefit of an incident and injury free environment.

Alberta Apprenticeship and Industry Training Board Safety Policy

The Alberta Apprenticeship and Industry Training Board (board) fully supports safe learning and working environments and emphasizes the importance of safety awareness and education throughout apprenticeship training- in both on-the- job training and technical training. The board also recognizes that safety awareness and education begins on the first day of on-the-job training and thereby is the initial and ongoing responsibility of the employer and the apprentice as required under workplace health and safety training. However the board encourages that safe workplace behaviour is modeled not only during on-the-job training but also during all aspects of technical training, in particular, shop or lab instruction. Therefore the board recognizes that safety awareness and training in apprenticeship technical training reinforces, but does not replace, employer safety training that is required under workplace health and safety legislation.

The board has established a policy with respect to safety awareness and training:

> **The board promotes and supports safe workplaces, which embody a culture of safety for all apprentices, employers and employees. Employer required safety training is the responsibility of the employer and the apprentice, as required under legislation other than the *Apprenticeship and Industry Training Act.***

The board's complete document on its 'Apprenticeship Safety Training Policy' is available at www.tradesecrets.alberta.ca; access the website and conduct a search for 'safety training policy'.

Implementation of the policy includes three common safety learning outcomes and objectives for all trade course outlines. These common learning outcomes ensure that each course outline utilizes common language consistent with workplace health and safety terminology. Under the title of 'Standard Workplace Safety', this first section of each trade course outline enables the delivery of generic safety training; technical training providers will provide trade specific examples related to the content delivery of course outline safety training.

Workplace Health and Safety

A tradesperson is often exposed to more hazards than any other person in the work force and therefore should be familiar with and apply the Occupational Health and Safety Act, Regulations and Code when dealing with personal safety and the special safety rules that apply to all daily tasks.

Workplace Health and Safety (Alberta Employment and Immigration) conducts periodic inspections of workplaces to ensure that safety regulations for industry are being observed.

Additional information is available at www.worksafely.org

Technical Training

Apprenticeship technical training is delivered by the technical institutes and many colleges in the public post-secondary system throughout Alberta. The colleges and institutes are committed to delivering the technical training component of Alberta apprenticeship programs in a safe, efficient and effective manner. All training providers place great emphasis on safe technical practices that complement safe workplace practices and help to develop a skilled, safe workforce.

The following institutions deliver Sprinkler Systems Installer apprenticeship technical training:

Red Deer College

Procedures for Recommending Revisions to the Course Outline

Advanced Education has prepared this course outline in partnership with the Sprinkler Systems Installer Provincial Apprenticeship Committee.

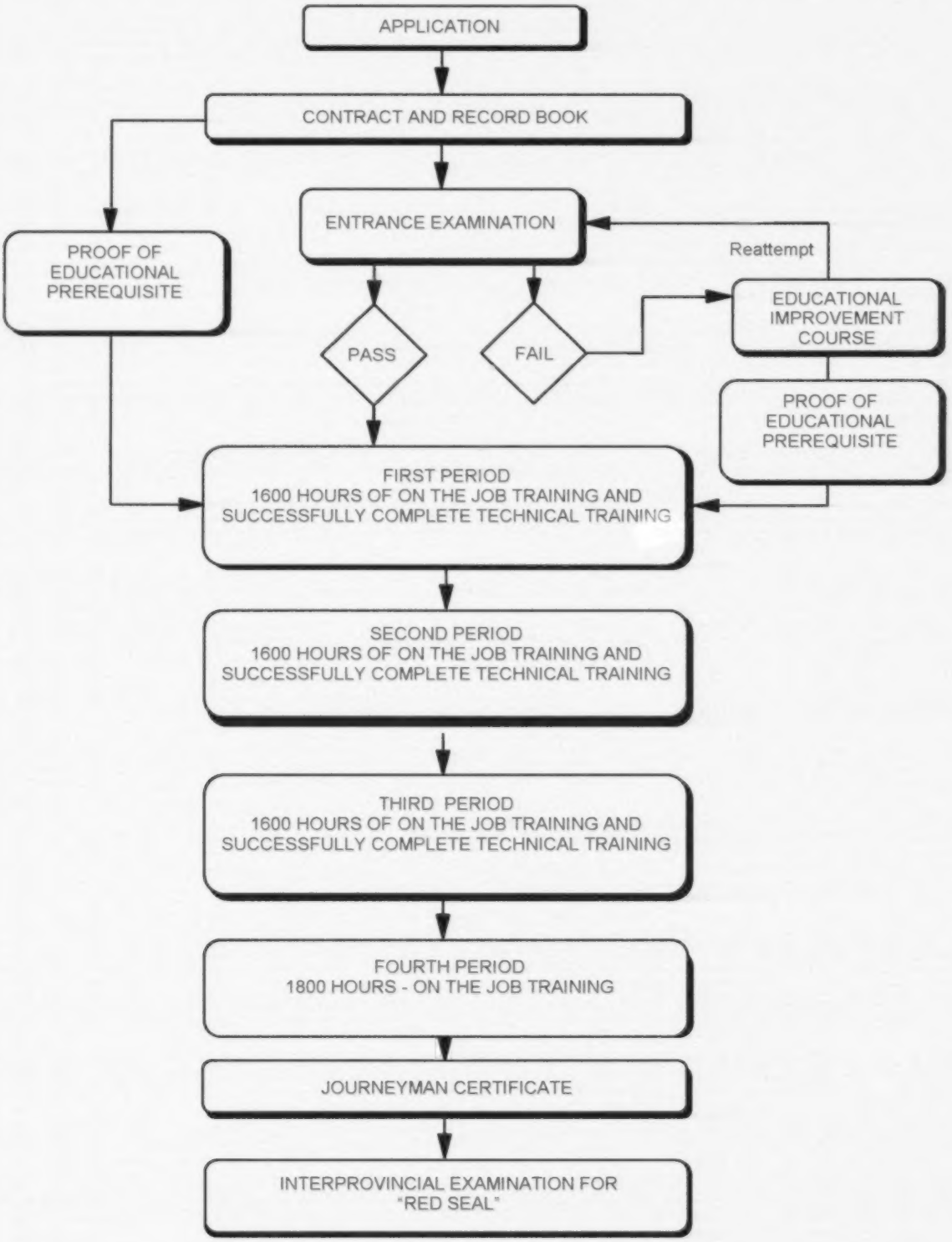
This course outline was approved on November 4, 2011 by the Alberta Apprenticeship and Industry Training Board on a recommendation from the Provincial Apprenticeship Committee. The valuable input provided by representatives of industry and the institutions that provide the technical training is acknowledged.

Any concerned individual or group in the province of Alberta may make recommendations for change by writing to:

Sprinkler Systems Installer Provincial Apprenticeship Committee
c/o Industry Programs and Standards
Apprenticeship and Industry Training
Advanced Education
10th floor, Commerce Place
10155 102 Street NW
Edmonton AB T5J 4L5

It is requested that recommendations for change refer to specific areas and state references used. Recommendations for change will be placed on the agenda for regular meetings of the Sprinkler Systems Installer Provincial Apprenticeship Committee.

Apprenticeship Route toward Certification


APPLICATION
CONTRACT AND RECORD BOOK
ENTRANCE EXAMINATION
PROOF OF EDUCATIONAL PREREQUISITE
Reattempt
EDUCATIONAL IMPROVEMENT COURSE
PASS
FAIL
PROOF OF EDUCATIONAL PREREQUISITE
FIRST PERIOD
1600 HOURS OF ON THE JOB TRAINING AND SUCCESSFULLY COMPLETE TECHNICAL TRAINING
SECOND PERIOD
1600 HOURS OF ON THE JOB TRAINING AND SUCCESSFULLY COMPLETE TECHNICAL TRAINING
THIRD PERIOD
1600 HOURS OF ON THE JOB TRAINING AND SUCCESSFULLY COMPLETE TECHNICAL TRAINING
FOURTH PERIOD
1800 HOURS - ON THE JOB TRAINING
JOURNEYMAN CERTIFICATE
INTERPROVINCIAL EXAMINATION FOR "RED SEAL"

Sprinkler Systems Installer Training Profile
FIRST PERIOD
(8 Weeks 30 Hours per Week – Total of 240 Hours)

SECTION ONE

STANDARD WORKPLACE SAFETY
30 HOURS

A	B	C
Safety Legislation, Regulations & Industry Policy in the Trades – 4 Hours	Climbing, Lifting, Rigging and Hoisting – 3 Hours	Hazardous Materials & Fire Protection – 3 Hours
D	**E**	**F**
Rigging – 10 Hours	Climbing and Elevated Work Platforms – 6 Hours	Portable Fire Extinguishers – 4 Hours

SECTION TWO

GENERAL PIPING AND MATERIALS
66 HOURS

A	B	C
Steel Pipe – 4 Hours	Threaded Pipe and Fittings – 11 Hours	Plastic Pipe – 10 Hours
D	**E**	**F**
Ferrous and Non-Ferrous Tube and Tubing – 2 Hours	Soldering – 8 Hours	Valves – 8 Hours
G	**H**	**I**
Hangers and Sway Bracing – 5 Hours	Grooved Pipe and Fittings and Flanged Pipe Fittings – 6 Hours	Hand and Power Tools – 8 Hours
J		
Powder Activated Tools – 4 Hours		

SECTION THREE

SPRINKLER SYSTEMS AND ALARMS
76 HOURS

A	B	C
Introduction to the Sprinkler Systems Industry – 4 Hours	Apprenticeship System – 2 Hours	Introduction to NFPA Standards and Hazard Classifications – 4 Hours
D	**E**	**F**
Types of Automatic Sprinklers – 8 Hours	Automatic Sprinkler Characteristics – 6 Hours	Automatic Sprinkler Installation Requirements – 6 Hours
G	**H**	**I**
Wet Sprinkler Systems – 3 Hours	Wet Sprinkler System Components – 15 Hours	Dry Pipe Sprinkler Systems – 3 Hours
J	**K**	
Dry Pipe Sprinkler System Components – 19 Hours	Antifreeze Sprinkler Systems – 6 Hours	

SECTION FOUR

MATHEMATICS , SCIENCE and DRAWINGS

68 HOURS

A	B	C
Basic Mathematic Skills 6 Hours	Number Conversions 6 Hours	Perimeter, Area and Segments of a Circle 7 Hours
D	**E**	**F**
Ratios and Percentage 4 Hours	Properties of Water and Density 6 Hours	Pressure and Atmosphere 6 Hours
G	**H**	**I**
Environmental Impact 3 Hours	Introduction to Fire Science 4 Hours	Introduction to Sketching and Drawing 6 Hours
J	**K**	**L**
Views of a Building 2 Hours	Dimensioning and Scaling 2 Hours	Sections 4 Hours
M	**N**	
Symbols and Single Line Pipe Drawings 6 Hours	Applied Blueprint Reading 6 Hours	

SECOND PERIOD
(8 Weeks 30 Hours per Week – Total of 240 Hours)

SECTION ONE

PIPING THEORY — **42 HOURS**

A	B	C
Pipe Sizing — 4 Hours	Piping Arrangements — 9 Hours	Protection From Freezing — 4 Hours
D	**E**	**F**
Drainage of Mains, Branches and Valves — 5 Hours	Introduction to Welding and Cutting Safety — 14 Hours	Brazing Copper Joints — 6 Hours

SECTION TWO

FIRE SPRINKLERS AND SPRINKLER SYSTEM APPLICATIONS — **52 HOURS**

A	B	C
Sprinkler Regulations and Symbols — 6 Hours	Installation Requirements for Sprinklers — 6 Hours	Sprinkler Location and Clearances — 10 Hours
D	**E**	**F**
Identify Special Application Sprinklers — 6 Hours	Requirements for Special Sprinklers — 6 Hours	Residential Sprinkler Systems — 12 Hours
G		
Installation Requirements for Residential Sprinkler Systems — 6 Hours		

SECTION THREE

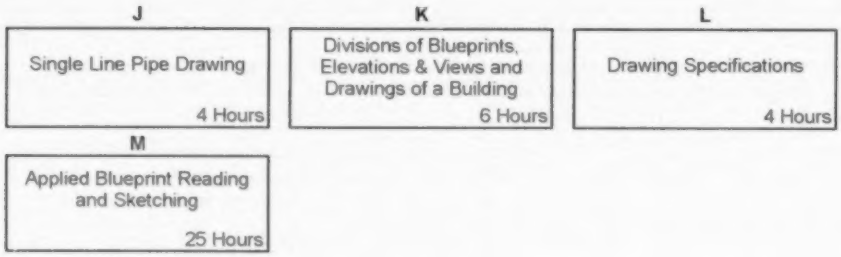
HYDRANTS, STAND PIPES AND WATER SUPPLY — **49 HOURS**

A	B	C
Types of Water Supply — 4 Hours	Water Supply Installation — 6 Hours	Corrosive Water Supply — 6 Hours
D	**E**	**F**
Fire Hydrant Equipment — 6 Hours	Installation Requirements for Fire Hydrant Equipment — 9 Hours	Stand Pipe and Hose Systems — 5 Hours
G	**H**	
Installation Requirements for Standpipe and Hose Systems — 9 Hours	Fire Department Connections — 4 Hours	

SECTION FOUR

MATHEMATICS, SCIENCE and DRAWINGS — **97 HOURS**

A	B	C
Pressure and Density — 4 Hours	Pressure and Relative Density — 6 Hours	Buoyancy, Water Properties and Flow — 4 Hours
D	**E**	**F**
Volumes — 4 Hours	Capacities — 4 Hours	Introduction to Electricity — 6 Hours
G	**H**	**I**
Grade and Hanger Calculation — 6 Hours	Triangles — 6 Hours	Piping Offsets — 18 Hours


J
Single Line Pipe Drawing
4 Hours
K
Divisions of Blueprints, Elevations & Views and Drawings of a Building
6 Hours
L
Drawing Specifications
4 Hours
M
Applied Blueprint Reading and Sketching
25 Hours

THIRD PERIOD
(8 Weeks 30 Hours per Week – Total of 240 Hours)

SECTION ONE

FIRE PUMPS
34 HOURS

A	B	C
Introduction to Fire Pumps 4 Hours	Types of Fire Pumps 4 Hours	Fire Pump Sizing 4 Hours
D	**E**	**F**
Installation and Commissioning Requirements for Fire Pumps 6 Hours	Testing and Maintenance of Fire Pumps 6 Hours	Piping for Sensing Lines 10 Hours

SECTION TWO

SPECIAL HAZARD SYSTEMS
71 HOURS

A	B	C
Dry and Wet Chemical Systems 4 Hours	Fixed Water Spray Systems & Water Spray Nozzles 4 Hours	Introduction to Foam Extinguishing Systems 4 Hours
D	**E**	**F**
Installation Requirements for Foam Extinguishing Systems 4 Hours	Outside Exposure Systems 4 Hours	Introduction to Carbon Dioxide Systems 5 Hours
G	**H**	**I**
Pre-action Systems 17 Hours	Deluge Systems 17 Hours	Clean Agent Extinguishing Systems 6 Hours
J	**K**	
Water Mist 4 Hours	Air Sampling & Spark Detection 2 Hours	

SECTION THREE

INSPECTION TESTING MAINTENANCE AND REPORTS
42 HOURS

A	B	C
Legal Aspects of Fire Protection 2 Hours	Introduction to Alberta Building and Fire Codes 8 Hours	Inspection of Water Based Sprinkler Systems 8 Hours
D	**E**	**F**
Testing of Water Based Sprinkler Systems 8 Hours	Maintenance of Water Based Sprinkler Systems 8 Hours	Reporting Process 8 Hours

SECTION FOUR

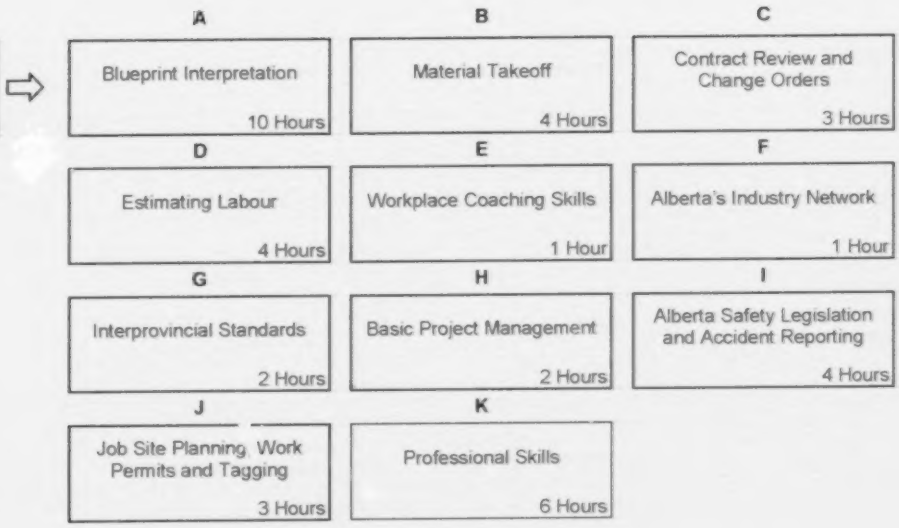
ELECTRICAL APPLICATIONS, MATHEMATICS and SCIENCE
53 HOURS

A	B	C
Introduction to Fire Alarm Panels 6 Hours	Electrical Test Equipment 4 Hours	Electrical Components for a Wet Sprinkler System 4 Hours
D	**E**	**F**
Electrical Components for a Dry Pipe Sprinkler System 6 Hours	Electrical Components for a Pre-Action and Deluge System 8 Hours	Electrical Components for Clean Agent Systems 4 Hours
G	**H**	**I**
Basic Hydraulic Calculations 11 Hours	Piping Offsets 6 Hours	Fire Loading 4 Hours

SECTION FIVE

JOB SITE MANAGEMENT

40 HOURS



NOTE: The hours stated are for guidance and should be adhered to as closely as possible. However, adjustments must be made for rate of apprentice learning, statutory holidays, registration and examinations for the training establishment and Apprenticeship and Industry Training.

FIRST PERIOD TECHNICAL TRAINING
Sprinkler Systems Installer Trade
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE: ..... STANDARD WORKPLACE SAFETY ..... 30 HOURS

A. Safety Legislation, Regulations & Industry Policy in the Trades ..... 4 Hours

Outcome: Describe legislation, regulations and practices intended to ensure a safe work place in the trade.

1. Demonstrate the ability to apply the Occupational Health and Safety Act, Regulation and Code.
2. Explain the role of the employer and employee in regard to Occupational Health and Safety (OH&S) regulations, Worksite Hazardous Materials Information Systems (WHMIS), fire regulations, Workers Compensation Board regulations, and related advisory bodies and agencies.
3. Explain industry practices for hazard assessment and control procedures.
4. Describe the responsibilities of workers and employers to apply emergency procedures.
5. Describe positive tradesperson attitudes with respect to housekeeping, personal protective equipment and emergency procedures.
6. Describe the roles and responsibilities of employers and employees with respect to the selection and use of personal protective equipment (PPE).
7. Select, use and maintain appropriate PPE for worksite applications.

B. Climbing, Lifting, Rigging and Hoisting ..... 3 Hours

Outcome: Describe the use of personal protective equipment (PPE) and safe practices for climbing, lifting, rigging and hoisting in this trade.

1. Select, use and maintain specialized PPE for climbing, lifting and load moving equipment.
2. Describe manual lifting procedures using correct body mechanics.
3. Describe rigging hardware and the safety factor associated with each item.
4. Select the correct equipment for rigging typical loads.
5. Describe hoisting and load moving procedures.

C. Hazardous Materials & Fire Protection ..... 3 Hours

Outcome: Describe the safety practices for hazardous materials and fire protection in this trade.

1. Describe the roles, responsibilities features and practices related to the workplace hazardous materials information systems (WHIMIS) program.
2. Describe the three key elements of WHMIS.
3. Describe handling, storing and transporting procedures when dealing with hazardous material.
4. Describe safe venting procedures when working with hazardous materials.
5. Describe fire hazards, classes, procedures and equipment related to fire protection.

D. Rigging ..... 10 Hours

Outcome: Identify types of rope and various rigging components, and tie basic knots and hitches.

1. State the characteristics, parts, uses and safe work loads of different types of fibre rope.
2. Explain the proper care and maintenance of natural fibre and synthetic ropes.
3. State the names, applications and safety factors for popular knots and hitches used for lifting and pulling, and tying loads to trucks.
4. State the characteristics, parts, uses and safe work loads of different types of wire rope, and the proper care and maintenance of wire ropes and slings.
5. Identify the names, applications, safe working loads, methods of securing and maintenance of chain falls, come-longs, turfers and snatch blocks.
6. Demonstrate hand signals for crane operation.

E. Climbing and Elevated Work Platforms ..... 6 Hours

Outcome: Describe the various climbing and elevated work platforms used in the sprinkler industry.

1. Identify the different styles of steps and ladders used in the construction industry and the applicable regulations.
2. Identify the different styles of elevated work platforms used in the construction industry.
3. State the regulations pertaining to the use of elevated work platforms in the construction industry.
4. Explain how to erect scaffolds and platforms in a safe manner with regard to safety rails and toe boards.
5. Identify safe practices when working with ladders and scaffolds.
6. Describe requirements for basic fall protection equipment.

F. Portable Fire Extinguishers ..... 4 Hours

Outcome: Describe the requirements of Occupational Health and Safety pertaining to portable fire extinguishers.

1. List the approved types of portable fire extinguishers and define their characteristics.
2. Identify the class or classes of fires that each extinguisher is recommended for.
3. Describe the operation of each type of extinguisher.
4. State the testing and maintenance requirements of each type of fire extinguisher.

SECTION TWO: ..... GENERAL PIPING AND MATERIALS ..... 66 HOURS

A. Steel Pipe ..... 4 Hours

Outcome: Describe technical data and installation requirements for steel pipe.

1. Describe the composition of steel pipe used by the sprinkler system installer.
2. Identify schedule numbers and grades of steel pipe.
3. Explain pressure ratings of different pipe schedules and grades.
4. State pipe sizes, lengths and end finishes.

5. Identify different protective coatings and linings applied to piping used by the sprinkler system installer.
6. State regulations and manufacturer's specifications pertaining to steel pipe used by the sprinkler system installer.

B. Threaded Pipe and Fittings ..... 11 Hours

Outcome: Identify the requirements for assembly of threaded pipe and fittings.

1. Define code regulations and manufacturer's information pertaining to threaded pipe and fittings.
2. Describe the application and purpose of thread cutting lubricants.
3. Identify the types, sizes and pressure ratings for threaded fittings.
4. Describe the fabrication processes and techniques for threaded fittings.
5. Explain the installation procedures used for threaded pipe.
6. Assemble and test an assigned project.

C. Plastic Pipe ..... 10 Hours

Outcome: Identify the requirements for assembly of plastic pipe fittings.

1. Define code regulations and manufacturer's instructions pertaining to plastic pipe materials.
2. Describe the types of plastic pipe and fittings approved to use in the sprinkler systems industry.
3. Describe the correct fabrication processes and techniques for solvent welding plastic pipe and fittings used in the sprinkler industry.
4. Explain the correct installation procedures used for solvent welding plastic pipe and fittings.
5. Assemble and test an assigned project.

D. Ferrous and Non-Ferrous Tube and Tubing ..... 2 Hours

Outcome: Identify the requirements for assembly of ferrous and non-ferrous tube and tubing and related fittings.

1. Describe ferrous and non-ferrous tube and tubing used in the sprinkler system installer trade and state the application of each material.
2. State the differences and special requirements of tube and tubing.
3. Describe soldered tube and tubing materials and state where each would be used in the sprinkler system industry.

E. Soldering ..... 8 Hours

Outcome: Identify the requirements for soldering copper tube, tubing and fittings

1. Describe correct equipment and techniques used for making and assembling a soldered joint on tube or tubing in all sizes.
2. Describe the fabrication processes and safe procedures to be used when soft soldering tube and tubing for all sizes.
3. Interpret codes, regulations and manufacturer's instructions when assembling and heating solder joints.
4. Demonstrate electrical resistance soldering.
5. Assemble and test an assigned project.

F. Valves ..... 8 Hours

Outcome: Identify the requirements for installing and servicing valves.

1. Describe design, range of sizes and applications of types of approved valves used in sprinkler systems.
2. Define, pressure markings and ratings of various valves.
3. Identify correct installation procedures for valves.
4. Explain correct service and maintenance procedures for valves.
5. Interpret code, regulations and manufacturer's instructions pertaining to valves and their installation.

G. Hangers and Sway Bracing ..... 5 Hours

Outcome: Identify the requirements for installing hangers including sway bracing.

1. Identify pipe, tube and tubing hangers and their uses in the sprinkler system installer trade.
2. Explain how to control swaying of pipe.
3. Calculate hanger spacing and state maximum distances between hangers on different sizes of lines in both International System of Units (SI) and imperial units.
4. Identify different fasteners and inserts used to secure pipe, tube and tubing hangers.
5. Identify the correct installation tools and techniques for hangers, inserts, fasteners and supports.

H. Grooved Pipe and Fittings and Flanged Pipe Fittings ..... 6 Hours

Outcome: Identify the requirements for installing and servicing grooved pipe and fittings and flanged pipe fittings.

1. Explain the types of grooved and non grooved pipe fittings and materials used on various sprinkler systems.
2. Describe colour coding of gaskets and ratings of fittings and gaskets.
3. Describe correct fabrication processes and tools for grooved pipe and non grooved grip style piping.
4. Describe the correct tools and installation procedures used for the installation of grooved and grip style pipe and fittings.
5. Identify the types of flanged pipe fittings and materials used on various sprinkler systems.
6. Interpret codes, regulations and manufacturer's instructions pertaining to flanged pipe fittings and gasket materials.

I. Hand and Power Tools ..... 8 Hours

Outcome: Demonstrate the appropriate use of hand and power tools common to the sprinkler system trade, as well as their applications, maintenance and procedures.

1. Identify hand and power tools used in the sprinkler system installer trade.
2. Describe the power tool for the desired task.
3. Discuss workmanship, safety and correct operational procedures associated with hand and power tools.
4. Present the proper maintenance for hand and power tools.
5. State the regulations pertaining to the use of power and electrical tools.

6. Describe freeze packs, their purpose and demonstrate the advantages and uses of freeze packs in the sprinkler industry.

J. Powder Activated Tools ..... 4 Hours

Outcome: Describe the operation and safely use powder-activated tools.

1. State the differences of common powder-activated tools and fastening components used in the construction industry.
2. Explain the regulations pertaining to the use and application of powder-activated tools in the construction industry.
3. Describe the correct safety procedures when using powder-activated tools.
4. Demonstrate correct use of powder-activated tools.
5. Demonstrate the correct preventative maintenance needed to keep powder-activated tools in safe working order.

SECTION THREE: ..... SPRINKLER SYSTEMS AND ALARMS ..... 76 HOURS

A. Introduction to the Sprinkler Systems Industry ..... 4 Hours

Outcome: Describe the scope of the trade and the legislative requirements defined by Apprenticeship and Industry Training Act.

1. Describe the Alberta Apprenticeship and Industry Training Act.
2. Describe the scope for the Sprinkler System Installer trade.
3. Describe the Alberta Trade Regulation for Sprinkler Systems Installer.
4. Describe the apprenticeship contract and the purpose of the blue book.
5. List and describe possible career opportunities available in the sprinkler systems industry.

B. Apprenticeship System ..... 2 Hours

Outcome: Describe the Alberta Industry Network.

1. Define the Apprenticeship and Industry Network.
2. Explain the roles of the Local Apprenticeship Committee (LAC) and the Provincial Apprenticeship Committee (PAC).

C. Introduction to NFPA Standards and Hazards Classification ..... 4 Hours

Outcome: Describe NFPA Standards and Hazard Classifications.

1. Describe the purpose of the National Fire Protection Association (NFPA).
2. Describe the association between the Alberta Building Code and the NFPA standards.
3. Identify NFPA standards for various applications.
4. Identify and describe hazard classifications.

D. Types of Automatic Sprinklers ..... 8 Hours

Outcome: Describe the types of automatic sprinklers.

1. State materials used in manufacturing of sprinklers.
2. List the approvals required for sprinklers.
3. Describe the various types of sprinklers approved for use in sprinkler system installations.

4. Identify various design differences of standard and special application sprinklers and state their applications.

E. Automatic Sprinkler Characteristics ..... 6 Hours

Outcome: Explain the characteristics of automatic sprinklers.

1. Explain the variation in orifice sizes.
2. Describe coatings and finishes used on sprinklers.
3. Describe installation and removal procedures according to code and/or manufacturer's specifications.
4. Describe how maximum ceiling temperature is established.
5. List the temperature ratings of sprinklers and state how the rating is identified.
6. Identify the colour codes of various types of sprinklers and state their temperature ratings.

F. Automatic Sprinkler Installation Requirements ..... 6 Hours

Outcome: Describe the installation requirements for automatic sprinklers.

1. List the sources of heat effect sprinkler locations and state the minimum distances required.
2. Identify the spray pattern for each type of sprinklers and explain the terms effective throw and profile.
3. Identify where sprinklers may require protection.
4. Describe the effects of painting and excessive dust or dirt on sprinklers.
5. Describe how sprinklers require protection from environmental effects.

G. Wet Sprinkler Systems ..... 3 Hours

Outcome: Explain the requirements of a wet sprinkler system.

1. Define a wet sprinkler system, advantages and disadvantages, operation and installation requirements.
2. State the regulations and manufacturer's specifications for wet sprinkler systems.
3. Define the types of buildings that would require a wet sprinkler system.
4. Compare pipe schedule and hydraulically calculated system requirements.

H. Wet Sprinkler System Components ..... 15 Hours

Outcome: Explain the components of a wet sprinkler system.

1. Identify the approved control and alarm check valves, and their installation requirements and operation.
2. Describe the methods of preventing false alarms and the correct location for each device.
3. Detail the requirements for the installation of the inspector test and fire department connections.
4. Trim alarm valve on assigned project.

I. Dry Pipe Sprinkler Systems ..... 3 Hours

Outcome: Explain the requirements of a dry pipe sprinkler system.

1. Define a dry sprinkler system, advantages and disadvantages, operations and installation requirements.

2. State the regulations and manufacturer's specifications for dry pipe sprinkler systems.
3. Define the types of buildings that would require a dry pipe sprinkler system.

J. Dry Pipe Sprinkler System Components ..... 19 Hours

Outcome: List and explain the components of a dry pipe sprinkler system.

1. Identify the approved control and dry pipe valves, and describe their installation requirements and operation.
2. State installation requirements for quick-opening devices.
3. Explain the air supply requirements for a dry pipe sprinkler system.
4. Describe the requirements for the installation of the inspector test and fire department connections, and function of the auxiliary drain.
5. Trim dry pipe valve on assigned project.

K. Antifreeze Sprinkler Systems ..... 6 Hours

Outcome: Install antifreeze sprinkler systems according to code.

1. State the regulations and manufacturer's specifications for antifreeze sprinkler systems, its purpose and operation.
2. Identify the advantages and disadvantages, and the type of buildings that would require antifreeze sprinkler systems.
3. State the antifreeze solutions used in sprinkler systems along with their restrictions.
4. Describe the installation, testing and maintenance requirements for an antifreeze sprinkler system.
5. List the cross connection control and installation requirements for an antifreeze sprinkler system.
6. Explain the safety practices to be followed when installing antifreeze and the systems.

SECTION FOUR: ..... MATHEMATICS, SCIENCE AND DRAWINGS ..... 68 HOURS

A. Basic Mathematic Skills ..... 6 Hours

Outcome: Solve basic mathematical problems relevant to the trade, utilizing metric and imperial measurements.

1. Describe operations on a basic calculator.
2. Perform basic operations with whole numbers.
3. Perform basic operations with decimal numbers.
4. Perform basic operations with fractions and mixed numbers.

B. Number Conversions ..... 6 Hours

Outcome: Convert measurements using both metric and imperial system.

1. Convert commonly used metric and imperial units of measurement.
2. Convert fractions to decimal numbers.
3. Convert decimal numbers to fractions.
4. Convert decimal numbers and decimal inches to common fractions.
5. Convert decimal feet-to-feet and the nearest practical fraction of an inch.

C. Perimeter, Area and Segments of a Circle .....7 Hours

Outcome: Solve mathematical problems involving linear, perimeter, area and segments of a circle.

1. Identify key terms and concepts used in working with formulas.
2. Identify common formulas and solve problems for perimeter.
3. Identify common formulas and solve problems for area.
4. Identify the segments of a circle.

D. Ratios and Percentage .....4 Hours

Outcome: Solve mathematical problems involving percentage calculations.

1. Calculate ratio problems (express two quantities in the form of a ratio).
2. Calculate ratio problems (express two ratios in the form of a proportion).
3. Convert between fractions and percents.
4. Convert between decimals and percents.
5. Solve percent problems.

E. Properties of Water and Density .....6 Hours

Outcome: Identify the properties of water as they apply to the trade.

1. Explain terminology that relates to the properties of water and identify three states of matter that pertain to the sprinkler trade.
2. Explain adhesion, cohesion, surface tension and capillarity.
3. Explain density and calculate density, mass and volume of substances.
4. Explain relative density and calculate mass, volume and density of substances.

F. Pressure and Atmosphere .....6 Hours

Outcome: Identify the effects of pressure and atmosphere as they apply to the trade.

1. Explain the terms *pressure* and *force*.
2. State the six principles of hydrostatic pressure.
3. State pressure constants used for calculating pressures.
4. Perform pressure and force calculations in both imperial and metric units.
5. Describe atmospheric pressure and the affect of altitude.

G. Environmental Impact .....3 Hours

Outcome: Identify potential environmental concerns and regulations pertaining to the sprinkler system industry.

1. Identify hazardous materials.
2. Describe collection and disposal of hazardous materials.
3. Describe reporting procedures required for accidental release of hazardous materials.

H. Introduction to Fire Science ..... 4 Hours

Outcome: Identify the dynamics and effects of fire.

1. Describe the components and products of combustion.
2. Describe the stages of a fire.
3. Describe burning characteristics of combustible materials.
4. Describe the characteristics of flame spread.
5. Describe methods of fire containment and control.

I. Introduction into Sketching and Drawing ..... 6 Hours

Outcome: Draw and interpret basic orthographic drawings.

1. Explain the use of drafting equipment.
2. Locate typical drafting lines found on a blueprint.
3. Identify the three basic views of an orthographic projection.
4. Draw and label the three basic views of an orthographic drawing.

J. Views of a Building ..... 2 Hours

Outcome: Identify and apply plan and elevation views from a blueprint.

1. List the views of a building.
2. Orientate the four sides and compass elevation views.

K. Dimensioning and Scaling ..... 2 Hours

Outcome: Interpret blueprints and use a scale to determine dimensions in both metric and imperial measuring system.

1. Interpret architectural dimensions.
2. Read and interpret typical SI and Architect scale rules used for blueprint drawings.

L. Sections ..... 4 Hours

Outcome: Describe and draw section views of simple objects.

1. Identify and draw sections of simple objects.

M. Symbols and Single Line Pipe Drawings ..... 6 Hours

Outcome: Identify symbols and draw single line isometric and orthographic drawings.

1. Explain typical symbols found on a sprinkler system blueprint.
2. Describe common symbols used in the piping trades.
3. Draw and label in a legible manner, orthographic single line piping drawings using 90-degree elbows and tees.
4. Draw and label in a legible manner, isometric single line piping drawings using 90- degree elbows and tees.

N. Applied Blueprint Reading.....6 Hours

Outcome: Interpret blueprint information used in a typical sprinkler system.

1. Identify symbols used on typical sprinkler system drawings.
2. Explain specifications on blueprints.
3. Read a Site Plan in metric and imperial units.
4. Interpret blueprints of a typical wet system.

SECOND PERIOD TECHNICAL TRAINING
Sprinkler Systems Installer Trade
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE: ..... PIPING THEORY ..... 42 HOURS

A. Pipe Sizing ..... 4 Hours

Outcome: Apply NFPA and other codes and regulations governing pipe sizing for sprinkler systems.

1. Describe procedure to determine piping application and schedules.
2. Describe procedure to determine pipe size based on installation location.
3. Describe friction loss as it applies to pipe composition and size.

B. Piping Arrangements ..... 9 Hours

Outcome: Apply NFPA and other codes and regulations governing piping arrangements for sprinkler systems.

1. Identify codes and regulations pertaining to piping arrangements.
2. Identify types of piping systems.
3. Explain conditions that require special piping arrangements.
4. Describe requirements and procedures for installing flushing nipples and sizing caps.
5. Describe piping arrangements for return bends for pendant sprinklers.
6. Identify and explain the location and installation procedures for pipe sleeves
7. Describe piping arrangements pertaining to hand hose connections.
8. Explain piping arrangements pertaining to testing of dry and wet systems.
9. Describe periodic testing and maintenance procedures for special piping arrangements.

C. Protection from Freezing ..... 4 Hours

Outcome: Apply NFPA and other codes and regulations governing protection of sprinkler systems from freezing.

1. Explain hazards and damage that can occur if systems or controls are subject to freezing.
2. Identify installation requirements regarding freeze protection of sprinkler controls and systems.
3. State methods of protecting supply piping from possible freezing.
4. Explain types of building and locations within buildings where freeze protection would be installed.
5. Describe periodic testing and maintenance procedures for non-freeze systems.
6. List tools and materials for installation and testing of non-freeze systems.

D. Drainage of Mains, Branches and Valves ..... 5 Hours

Outcome: Apply NFPA and other codes and regulations governing drainage of piping, valves and appliances that are part of sprinkler systems.

1. Identify installation requirements regarding drainage of piping, valves and appliances.
2. State recommended grades for various piping components pertaining sprinkler systems.
3. Define code requirements for installation of main and auxiliary drains for various types of sprinkler systems.
4. Define code requirements for installation of auxiliary drains.
5. Describe periodic testing and maintenance procedures for main and auxiliary drains.

E. Introduction to Welding and Cutting Safety ..... 14 Hours

Outcome: Apply safe work practices and procedures when working with welding and cutting equipment.

1. Explain personal protective equipment for welding or when assisting a welder.
2. Describe the hazards associated with welding applications and activities.
3. Identify components associated with gas cutting equipment.
4. Identify components associated with gas welding equipment.
5. Identify components associated with arc welding equipment.
6. Apply oxy-fuel cutting procedures to an assigned project.
7. Apply welding procedures to an assigned project.

F. Brazing Copper Joints ..... 6 Hours

Outcome: Braze copper or brass joints to specific codes and requirements.

1. Identify installation requirements regarding the use of brazed joints.
2. Identify the equipment and materials pertaining to brazing.
3. Describe brazing procedure.
4. Select required tip and balance the torch.
5. Assemble and test assigned project.

SECTION TWO: .....FIRE SPRINKLERS AND SPRINKLER SYSTEM APPLICATIONS .....52 HOURS

A. Sprinkler Regulations and Symbols ..... 6 Hours

Outcome: Identify NFPA and other applicable regulations used to install sprinklers.

1. Explain NFPA and other applicable regulations regarding the location of sprinklers.
2. Explain the general requirements and importance of positioning sprinklers.
3. Identify sprinkler symbols used on drawings.

B. Installation Requirements for Sprinklers ..... 6 Hours

Outcome: Select and install sprinklers to applicable installation standards and manufacturer's specifications.

1. Identify factors that determine sprinkler selection.

2. Define the manufacturer's specification for sprinkler selection.
3. State the installation procedures of sprinklers.
4. State the installation procedures of sidewall sprinklers.
5. Detail the care and storage requirements for sprinklers.

C. Sprinkler Location and Clearances ..... 10 Hours

Outcome: State location and clearance requirements for sprinklers.

1. Explain the location requirements of sprinklers in relations to building components.
2. State required distances between sprinklers for specific locations and applications.
3. Describe sprinkler deflector positioning in relations to various building components.
4. State the position of a sidewall sprinkler deflector in relation to various building components.
5. Identify the clearances required between high piled storage materials and sprinkler deflectors.

D. Identify Special Application Sprinklers ..... 6 Hours

Outcome: Identify sprinklers used in specific applications.

1. Define specific applications.
2. Describe various types of sprinklers used in specific applications in residential occupancies.
3. Describe various types of sprinklers used in specific applications in commercial occupancies.
4. Describe various types of sprinklers used in specific applications in industrial occupancies.
5. Describe various types of sprinklers used in specific applications in institutional occupancies.

E. Requirements for Special Sprinklers ..... 6 Hours

Outcome: Identify the installation requirements for sprinklers in specific applications.

1. State the installation requirements of sprinklers used for residential occupancies.
2. State the installation requirements of sprinklers used in commercial occupancies.
3. State the installation requirements of sprinklers used in industrial occupancies.
4. State the installation requirements of sprinklers used in institutional occupancies.

F. Residential Sprinkler System ..... 12 Hours

Outcome: Identify residential sprinkler systems and their components.

1. Explain the advantages and perceived disadvantages of a residential sprinkler system.
2. Define water supply requirements for residential systems.
3. Identify approved materials used in residential sprinkler systems.
4. Describe approved sprinklers for residential systems.
5. Layout sprinklers and piping on a residential drawing sprinkler system.

G. Installation Requirements for Residential Sprinkler Systems ..... 6 Hours

Outcome: State the installation requirements of residential sprinkler systems.

1. Identify NFPA and other regulations regarding residential sprinkler systems.
2. Explain testing requirements associated with residential sprinkler systems.
3. Explain maintenance requirements associated with residential sprinkler systems.

4. Identify allowable installation practices for sprinklers in residential sprinkler system.

SECTION THREE: .....HYDRANTS, STAND PIPES AND WATER SUPPLY .....49 HOURS

A. Types of Water Supply .....4 Hours

Outcome: Identify water supplies for fire systems as required by codes and standards

1. Identify applicable codes and regulations regarding the application of water supply.
2. Define terminology associated with water supply.
3. Identify various water supply sources.

B. Water Supply Installations .....6 Hours

Outcome: Identify water supply installation requirements.

1. Identify NFPA requirements regarding the installation of water supply.
2. Explain applications for various water supply sources.
3. State installation requirements for various water supply components.
4. State flushing and testing requirements for underground piping prior to system connection.

C. Corrosive Water Supply .....6 Hours

Outcome: Describe corrosive water supplies relating to fire systems.

1. Identify the codes and standards for maintenance and prevention of corrosive water supplies.
2. List the methods used to identify corrosive water supplies.
3. State the requirements for reporting corrosive water supplies.
4. Identify corrective methods for prevention and maintenance of corrosive water supplies.

D. Fire Hydrant Equipment .....6 Hours

Outcome: Identify various types of fire hydrants and associated equipment.

1. Identify NFPA and other applicable regulations regarding fire hydrants and equipment.
2. Describe the purpose and locations of fire hydrants.
3. Identify types and components of fire hydrants.
4. List the requirements of hose outlets and thread types.
5. Describe associated fire hydrant equipment.

E. Installation Requirements for Fire Hydrant Equipment .....9 Hours

Outcome: Apply NFPA and other codes and regulations governing applications and installations of various types of fire hydrants and associated equipment.

1. State the installation requirements.
2. Describe the application of specialty tools.
3. Describe the procedures for operating fire hydrants.
4. State the testing requirements for fire hydrants.
5. List inspection and maintenance procedures.
6. Identify the procedures for decommissioning of fire hydrants.

F. Stand Pipe and Hose Systems ..... 5 Hours

Outcome: Identify various types of stand pipe and hose systems.

1. Identify NFPA and other applicable regulations regarding stand pipe and hose systems.
2. Describe the purpose and locations of stand pipe and hose systems.
3. Identify types and components of stand pipe and hose systems.
4. List the requirements of stand pipe and hose systems.
5. Describe associated stand pipe and hose equipment.

G. Installation Requirements for Stand Pipe and Hose Systems ..... 9 Hours

Outcome: Apply NFPA and other codes and regulations governing applications and installations of stand pipe and hose systems.

1. Identify the installation requirements of stand pipes.
2. List the installation requirements of hose systems.
3. State the testing requirements for stand pipe and hose systems.
4. Identify the inspection and maintenance procedures.

H. Fire Department Connections ..... 4 Hours

Outcome: Apply NFPA and other codes and regulations governing applications and installations of fire department connections.

1. Describe the purpose and locations of fire department connections.
2. Identify types and components of fire department connections.
3. Describe the installation requirements of fire department connections.
4. State the requirements for inspection of fire department connections.

SECTION FOUR: ..... MATHEMATICS, SCIENCE AND DRAWINGS ..... 97 HOURS

A. Pressure and Density ..... 4 Hours

Outcome: Solve mathematical problems involving pressure and density.

1. Define the terminology that relates to *pressure* and *force*.
2. Define Pascal's Law.
3. Define density, and state the density of water and air in SI, imperial and U.S. units.
4. Use densities to calculate the mass of the contents of various shaped solids and storage vessels.

B. Pressure and Relative Density ..... 6 Hours

Outcome: Solve mathematical problems involving pressure and density.

1. Define relative density and state the relative density of water.
2. Describe the effects of pressure on water.
3. Explain the transmission of pressure within pipes and tanks.
4. Calculate head pressure and total force for pipes and tanks
5. Calculate rate of flow through a pipe at a given pressure.

C. Buoyancy, Water Properties and Flow ..... **4 Hours**

Outcome: Utilize standard science fundamentals relevant to the sprinkler installer trade.

1. Describe the chemical properties of water and the effects of temperature on water.
2. Describe the terminology pertaining to the flow of water.
3. Define the term and applications for a venturi and explain the effects of flow, volume and pressure through a venture.
4. Explain head pressure as it relates to pumps.

D. Volumes ..... **4 Hours**

Outcome: Solve mathematical problems with respect to volumes and capacities.

1. State the formula for calculating the volume of regular shaped solids.
2. Calculate the volumes of regular shaped solids in both imperial and SI units.
3. State the formulas for calculating the volume of tanks and cylinders.
4. Calculate the volumes of tanks and cylinders in both imperial and SI units.

E. Capacities ..... **4 Hours**

Outcome: Solve mathematical problems with respect to volumes and capacities.

1. State the formula for calculating the capacity of regular shaped solids.
2. Calculate the capacity of regular shaped solids in both imperial and SI units.
3. State the formulas for calculating the capacity of tanks and cylinders.
4. Calculate the capacity of tanks and cylinders in both in both imperial and SI units.

F. Introduction to Electricity ..... **6 Hours**

Outcome: Define electrical terms and principles for simple circuits.

1. Explain the electron theory of electricity and the basic principles.
2. Explain the safety requirements when working with electricity.
3. Explain the principles of alternating and direct current flows of electricity.
4. Describe and demonstrate simple electrical circuits.
5. Explain the principles of electromagnetism and list the operating principles for electromagnetic devices.
6. Describe the function and operation of system devices used in a sprinkler system.

G. Grade and Hanger Calculation ..... **6 Hours**

Outcome: Solve mathematical problems regarding grade and hanger calculations.

1. Calculate grade on pipe in both SI and imperial units.
2. Calculate grade from percent in both SI and imperial units.
3. Calculate progressive lengths of hanger rod.
4. Calculate correct number of hangers required for given lengths of pipe.

H. Triangles ..... 6 Hours

Outcome: Solve mathematical problems involving triangles.

1. Explain equilateral and 90 degree triangles and their use in sprinkler installations.
2. Calculate the sum of the angles and the length of the sides for a 90 degree triangle.
3. Demonstrate how to square using the 3-4-5 triangle.

I. Piping Offsets ..... 18 Hours

Outcome: Solve mathematical problems involving 22.5-degree and 45-degree offsets.

1. Identify the formula for calculating 22.5 degree offsets.
2. Identify the formula for calculating 45 degree offsets.
3. Calculate offset travel for parallel offsets using imperial units.
4. Calculate offset travel for parallel offsets using SI units.
5. Calculate offset travel for equal spread offsets using imperial units.
6. Calculate offset travel for equal spread offsets using SI units.
7. Assemble a piping offset project as assigned.

J. Single Line Pipe Drawings ..... 4 Hours

Outcome: Correctly interpret and draw orthographic and isometric piping spool drawings to specific requirements.

1. Draw orthographic three views of a single line piping arrangement that consists of 45 degree fittings.
2. Draw orthographic three views of a single line piping arrangement that consists of 90 degree fittings.
3. Orientate single line piping drawings from orthographic "North" to isometric "North".
4. Draw isometric single line piping arrangements indicating "North" orientation.

K. Division of Blueprints, Elevations & Views and Drawings of a Building ..... 6 Hours

Outcome: Recognize and interpret blueprint divisions, views and elevations.

1. State the divisions of blueprints.
2. Describe views and drawings of a building from drawings and prints.
3. Describe elevations and section views of a building from drawings and prints.
4. Interpret geodetic elevations from drawings and prints.

L. Drawing Specifications ..... 4 Hours

Outcome: Read and interpret project specifications for Sprinkler applications.

1. Interpret information and specifications for a commercial sprinkler installation.
2. Interpret information and specifications for residential sprinkler systems.
3. Interpret information and specifications for fire hydrants and associated equipment.
4. Interpret information and specifications for standpipe systems.

M. Applied Blueprint Reading and Sketching..... 25 Hours

Outcome: Draw single line orthographic and isometric piping drawings.

1. Draw and label orthographic single line piping drawings.
2. Draw and label isometric single line piping drawings.
3. Draw and label a plan view of a sprinkler system for a commercial installation as per assigned project.

THIRD PERIOD TECHNICAL TRAINING
Sprinkler Systems Installer Trade
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE: ..... FIRE PUMPS ..... 34 HOURS

A. Introduction to Fire Pumps ..... 4 Hours

Outcome: Identify requirements for the use of a fire pump.

1. Identify NFPA and other applicable codes and regulations governing the application of fire pumps.
2. Describe basic pump principles.
3. Explain the purpose and location of fire pumps.
4. Describe the purpose of jockey pumps.

B. Types of Fire Pumps ..... 4 Hours

Outcome: Identify various types of fire pumps and associated equipment.

1. Identify types and components of fire pumps.
2. Compare types of pumps and list approval agencies.
3. Describe types of power supply used to operate pumps.
4. Describe the application of special service, booster pumps or jockey pumps.

C. Fire Pump Sizing ..... 4 Hours

Outcome: Apply pump sizing information.

1. Identify factors that determine pump and pipe sizing.
2. Describe capacities of pumps.
3. State factors that affect pump performance.
4. Interpret a typical fire pump curve.

D. Installation and Commissioning Requirements for Fire Pumps ..... 6 Hours

Outcome: Apply NFPA and other applicable codes and regulations governing the installation.

1. Interpret manufacturer's specifications and NFPA requirements regarding pump installation.
2. State requirements for a typical pump room and factors that affect the selection of power supply for pumps.
3. Describe associated equipment for fire pumps.
4. Describe pre-commissioning checks for fire pumps.
5. Describe the procedures for start-up of fire pumps.
6. Describe operational requirements for fire pumps.

E. Testing and Maintenance of Fire Pumps ..... 6 Hours

Outcome: Apply NFPA and other applicable codes and regulations governing the testing and maintenance of fire pumps.

1. State the testing requirements for fire pumps.
2. State problems associated with air leaks and air pockets.
3. Describe how to overcome air problems.
4. List inspection and maintenance procedures.
5. Describe the application of specialty tools.
6. Describe periodic testing and maintenance procedures associated with pumps.

F. Piping for Sensing Lines ..... 10 Hours

Outcome: Apply NFPA and other applicable codes and regulations governing the installation of piping for sensing lines.

1. Identify by name, grade, size and material the tube and tubing used for bending and compression purposes.
2. Identify by name the tools used for tube and tubing bending and compression installation.
3. Apply regulation codes regarding piping for sensing lines and manufacturer's information.
4. Describe safety practices to be followed for sensing line installations.
5. Assemble and test assigned project.

SECTION TWO: ..... SPECIAL HAZARD SYSTEMS ..... 71 HOURS

A. Dry and Wet Chemical Systems ..... 4 Hours

Outcome: Apply NFPA and other codes and regulations governing the application and installation of dry and wet chemical systems.

1. Define dry and wet chemical systems and associated components.
2. Explain the applications and methods of operation.
3. State the installation requirements.
4. State the testing requirements.
5. List inspection and maintenance requirements and procedures.

B. Fixed Water Spray Systems and Water Spray Nozzles ..... 4 Hours

Outcome: Apply NFPA and other codes and regulations governing the application and installation of fixed water spray systems.

1. Define fixed water spray systems, nozzles and associated components.
2. Explain the applications.
3. State the installation requirements.
4. State the testing requirements.
5. List inspection and maintenance requirements and procedures.

C. Introduction to Foam Extinguishing Systems ..... 4 Hours

Outcome: Explain the various foam extinguishing systems and components.

1. Describe foam extinguishing systems and their applications.
2. Identify types of foam concentrates, their characteristics, applications and extinguishing properties.
3. Describe the control, electrical and annunciation requirements for foam extinguishing systems.
4. Describe the operation and piping arrangements for various pressure proportioning systems.
5. List the types of sprinklers and foam-water nozzles used for foam extinguishing systems.

D. Installation Requirements for Foam Extinguishing Systems ..... 4 Hours

Outcome: Apply NFPA and other codes and regulations governing applications and installations of foam extinguishing systems.

1. Explain applicable NFPA installation standards and procedures for foam extinguishing systems.
2. Describe the installation of foam tanks, pumps, valves and associated accessories.
3. Identify the installation requirements for deluge valves in water foam extinguishing systems.
4. Explain the testing and maintenance procedures associated with foam extinguishing systems.

E. Outside Exposure Systems ..... 4 Hours

Outcome: Apply NFPA and other codes and regulations governing the application and installation of outside exposure systems.

1. Define outside exposure systems and associated components.
2. Explain the applications.
3. State the installation requirements.
4. State the testing requirements.
5. List inspection and maintenance requirements and procedures.

F. Introduction to Carbon Dioxide Systems ..... 5 Hours

Outcome: Apply NFPA and other codes and regulations governing the application and installation of carbon dioxide system.

1. Define carbon dioxide systems and associated components.
2. Explain the applications and methods of operation.
3. State the installation requirements.
4. State the testing requirements.
5. List inspection and maintenance requirements and procedures.

G. Pre-Action Systems ..... 17 Hours

Outcome: Apply NFPA and other codes and regulations governing the application and installation of pre-action systems.

1. Define pre-action systems and associated components.
2. Describe the applications and methods of operation.
3. State the installation requirements.
4. State the testing requirements.
5. List inspection and maintenance requirements and procedures.
6. Trim pre-action valve on assigned project.

H. Deluge Systems ..... 17 Hours

Outcome: Apply NFPA and other codes and regulations governing the application and installation of deluge systems.

1. Define deluge systems and associated components.
2. Describe the applications and methods of operation.
3. State the installation requirements.
4. State the testing requirements.
5. List inspection and maintenance requirements and procedures.
6. Trim deluge valve on assigned project.

I. Clean Agent Extinguishing Systems ..... 6 Hours

Outcome: Apply NFPA and other codes and regulations governing the application and installation of clean agent systems.

1. Define clean agent systems and associated components.
2. Describe the applications and methods of operation.
3. State the installation requirements.
4. State the testing requirements.
5. List inspection and maintenance requirements and procedures.
6. Explain what is meant by "inert" as it pertains to use in fire protection.

J. Water Mist ..... 4 Hours

Outcome: Apply NFPA and other codes and regulations governing the application and installation of water mist systems.

1. List and define water mist systems and associated components.
2. Describe the applications and methods of operation.
3. State the installation requirements.
4. State the testing requirements.
5. List inspection and maintenance requirements and procedures.

K. Air Sampling & Spark Detection ..... 2 Hours

Outcome: ***Apply NFPA and other codes and regulations governing the application and installation of air sampling and spark detection systems.***

1. Define air sampling and spark detection systems and associated components.
2. Describe the applications and methods of operation.
3. State the installation requirements.
4. State the testing requirements.
5. List inspection and maintenance requirements and procedures.

SECTION THREE: .....INSPECTION TESTING, MAINTENANCE AND REPORTS .....42 HOURS

A. Legal Aspects of Fire Protection ..... 2 Hours

Outcome: ***Identify the legal responsibilities of parties involved in owning and maintaining a fire protection system.***

1. Describe the legal implications of an impaired system and the responsibility of the sprinkler systems installer in reporting an impaired system.
2. Describe Owners Responsibility and sprinkler systems installer responsibility pertaining to sprinkler system inspection reporting.

B. Introduction to Alberta Building and Fire Code ..... 8 Hours

Outcome: ***Apply the Alberta Building and Fire Code and their applicable STANDATA in reference to sprinkler systems.***

1. Identify the sections of the Alberta Building Code that pertain to fire protection.
2. Identify the sections of the Alberta Fire Code that pertain to sprinkler system installation.
3. Apply the appropriate sections of the Alberta Building Code to sprinkler system scenarios.
4. Identify differences between Alberta and National Building Code.
5. Describe the purpose and location of a STANDATA

C. Inspection of Water Based Sprinkler Systems ..... 8 Hours

Outcome: ***Apply NFPA, other codes, regulations and manufactures' requirements governing inspection of water based systems.***

1. Identify the inspection requirements.
2. Describe inspection of water based sprinkler systems.
3. Describe common causes of sprinkler systems failure.
4. Explain the process for inspection of water based system components.
5. State the reporting requirements for inspection of water based systems.

D. Testing of Water Based Sprinkler Systems ..... 8 Hours

Outcome: Apply NFPA, other codes, regulations and manufactures' requirements governing testing of water based systems.

1. Identify the testing requirements.
2. Describe testing of water based sprinkler systems.
3. Explain the process for testing of water based system components.
4. State the reporting requirements for testing of water based systems.

E. Maintenance of Water Based Sprinkler Systems ..... 8 Hours

Outcome: Apply NFPA, other codes, regulations and manufactures' requirements governing maintenance of water based systems.

1. Identify the maintenance requirements.
2. Describe maintenance of water based sprinkler systems.
3. Explain the process for maintenance of water based system components.
4. State the reporting requirements for maintenance of water based systems.

F. Reporting Process ..... 8 Hours

Outcome: Apply best business practices for completing reports to industry standards.

1. Describe reports used by the Sprinkler System installer.
2. Demonstrate correct procedures for completing reports in a clear and concise manner.
3. Explain the purpose of each report.
4. Explain the process each report is normally subject to.

SECTION FOUR.....ELECTRICAL APPLICATIONS, MATHEMATICS & SCIENCE.....53 HOURS

A. Introduction to Fire Alarm Panels ..... 6 Hours

Outcome: Demonstrate knowledge of system components and basic operations of fire alarm panels.

1. Describe fire alarm panels and supervisory signals and define common terminology used with fire alarm panels.
2. List the types of fire alarm panels and detail their basic operation.
3. Explain the purpose of different types of alarms.
4. Explain the different type of signalling devices that could be installed with fire alarm panels.
5. Detail the testing and maintenance requirements for fire alarm panels and associated devices.
6. Explain the procedures for shutting down and reactivation of fire alarm panels.

B. Electrical Test Equipment ..... 4 Hours

Outcome: Demonstrate the safe use and function of electrical test equipment as it applies to electrical components on sprinkler systems.

1. Identify the types of electrical test equipment.
2. State the safety precautions required for each electrical testing device.

3. Describe the application of electrical test equipment.

C. Electrical Components for a Wet Sprinkler System ..... 4 Hours

Outcome: Apply NFPA standards, codes, regulations and manufactures' requirements governing electrical components for wet sprinkler systems.

1. State NFPA and manufacturer installation requirements.
2. Correctly identify the electrical components on a wet sprinkler system.
3. Identify location of electrical components.
4. Perform test of electrical components for wet systems.

D. Electrical Components for a Dry Pipe Sprinkler System ..... 6 Hours

Outcome: Apply NFPA, other codes, regulations and manufactures' requirements governing electrical components for dry pipe sprinkler systems.

1. State NFPA and manufacturer installation requirements.
2. Correctly identify the electrical components on a dry pipe sprinkler system.
3. Identify location of electrical components.
4. Perform test of electrical components for dry systems.

E. Electrical Components for a Pre-Action and Deluge System ..... 8 Hours

Outcome: Apply NFPA, other codes, regulations and manufactures' requirements governing electrical components for pre-action and deluge systems.

1. State NFPA and manufacturer installation requirements.
2. Correctly identify the electrical components on a pre-action and deluge system.
3. Identify location of electrical components.
4. Perform test of electrical components for pre-action and deluge systems.

F. Electrical Components for Clean Agent Systems ..... 4 Hours

Outcome: Apply NFPA, other codes, regulations and manufactures' requirements governing electrical components for clean agent systems.

1. State NFPA and manufacturer installation requirements.
2. Correctly identify the electrical components on clean agent systems.
3. Identify location of electrical components.
4. Perform test of electrical components for clean agent systems.

G. Basic Hydraulic Calculations ..... 11 Hours

Outcome: Apply NFPA and other codes and regulations governing hydraulic calculations.

1. Identify applicable NFPA codes and regulations regarding the layout of a hydraulically calculated sprinkler system.
2. Explain hydraulic calculation terms and how they apply to the Sprinkler Systems Installer trade.
3. Describe the classification of occupancies.
4. Describe the importance of water densities over a prescribed area.
5. Identify procedures to be followed in the hydraulic calculation process.

6. Calculate the effects of friction loss and water demand on a hydraulically calculated system.

H. Piping Offsets ..... 6 Hours

Outcome: Calculate piping offsets.

1. Identify the formula for calculating 45 degree offsets and calculate the length of travel using both imperial and SI units.
2. Calculate parallel unequal offset travel in both imperial and SI units.
3. Calculate parallel equal offset travel in both imperial and SI units.
4. Calculate rolling offset travel in both imperial and SI.

I. Fire Loading ..... 4 Hours

Outcome: Identify the effect of different materials on fire behavior and sprinkler system design.

1. Describe how materials of varying combustibility affect rate of fire spread and flame spread ratings.
2. Identify different means of packaging and storage of commodities and how they affect the system design process.
3. Explain what is meant by "flash point" and "flashover".
4. Identify substances that are classified as combustible, flammable, explosive and volatile.

SECTION FIVE: ..... JOB SITE MANAGEMENT ..... 40 HOURS

A. Blueprint Interpretation ..... 10 Hours

Outcome: Locate specific information in a set of blueprints and draw piping for the appropriate installation.

1. Interpret sprinkler systems information regarding an assigned project.
2. Correctly identify and interpret detailed information for blueprint applications.
3. Apply symbols and abbreviations on blueprints for an assigned project.
4. Draw and label an assigned sprinkler system project.

B. Material Takeoff ..... 4 Hours

Outcome: Compile a complete material list and estimate material.

1. Verify project specifications.
2. Explain the principles of estimating the costs for materials.
3. Explain the procedure to compile a complete materials list for assigned project.
4. Compile and cost material list for assigned project.

C. Contract Review and Change Orders ..... 3 Hours

Outcome: Identify the purpose and implementation of a contract.

1. Explain the purpose of a contract.
2. Understand the scope and terminology associated with a contract.
3. Identify the process for changes to a contract.

D. Estimating Labour ..... 4 Hours

Outcome: Estimate labour cost.

1. Verify project labour and safety specifications.
2. Explain the principles of estimating the costs for labour.
3. Explain the procedure to cost labour for assigned project.
4. Compile and cost material list for assigned project.

E. Workplace Coaching Skills ..... 1 Hour

Outcome: Display coaching skills.

1. Describe coaching skills used for training apprentices.

F. Alberta's Industry Network ..... 1 Hour

Outcome: Describe the role of the Alberta Apprenticeship and Industry Training Board and the network of industry committees that represent the trades and occupations in Alberta.

1. Describe Alberta's apprenticeship and industry training system.
2. Describe the roles and responsibilities of the Alberta Apprenticeship and Industry Training Board, government and post-secondary institutions.
3. Describe the roles and responsibilities of the PACs, LACs and occupational committees.

G. Interprovincial Standards ..... 2 Hours

Outcome: Use Red Seal products to challenge Interprovincial examination.

1. Identify Red Seal products used to develop Interprovincial examinations.
2. Use Red Seal products to prepare for an Interprovincial examination.

H. Basic Project Management ..... 2 Hours

Outcome: Recognize project management principles.

1. Describe the types of project management.
2. Identify the roles and responsibilities of project management.
3. State the importance of coordination and cooperation with other trades on a jobsite.

I. Alberta Safety Legislation and Accident Reporting ..... 4 Hours

Outcome: Apply Alberta Safety legislation and accident reporting to the workplace.

1. Describe the legislation pertaining to fire protection.
2. Explain the legal responsibility of the employer and employee.
3. Explain the legal responsibility of the property owner/manager.
4. State requirements for accident and incident reporting.

J. Job Site Planning, Work Permits and Tagging ..... 3 Hours

Outcome: Understand the importance of job site planning.

1. List stipulations of entering a jobsite.
2. Explain the purpose and procedures for acquiring work permits and tags.

K. Professional Skills ..... 6 Hours

Outcome: Carry out the professional responsibilities of a journeyperson in the sprinkler system installer trade.

1. Identify the responsibilities of a journeyperson sprinkler system installer.
2. Describe the professional expectations of journeyperson.
3. Describe effective communications skills.
4. Describe conflict resolution processes.
5. Apply communication, listening and negotiation skills to various scenarios.

Apprenticeship and Industry Training

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